PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:	ANOOP GUPTA.	EXAMINER:	J. E. SHEPARD
APPLICATION NO.:	09/775,393	ART UNIT:	2623
FILED:	JANUARY 31, 2001	CONF. NO:	7988
FOR:	**META DATA ENHANCED TELEVISION PROGRAMMING**		

Declaration Under 37 C.F.R. § 1.131

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Anoop Gupta, declare and state that:

1. I am the sole inventor of the invention described and claimed in U.S. Patent Application No. 09/775,393 (the "present application") filed January 31, 2001. This Declaration establishes invention in this country before January 18, 2001, and thus before the U.S. filing date of U.S. Patent Application Publication No. US2002/0095674 (Lowthert).

2. Before January 18, 2001, I conceived the invention currently presented in claims 16-75 of the present application. My conception of the invention is corroborated by the presentation which is attached to this Declaration as Exhibit A. The presentation was prepared before January 18, 2001.

3. After conceiving of this invention, I proceeded diligently by disclosing the invention to my employer, participating in activities related to reducing an embodiment of the invention to practice, and participating in patent preparation activities. On January 31, 2001, I constructively reduced this invention to practice by filing the present application.

4. I further declare that all statements herein made of my own knowledge are true, and that statements made on information or belief are believed to be true; and further, that the statements are made with the knowledge that the making of willful or false statements or the like is punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and may jeopardize the validity of any patent issuing from this patent application.

Anoop Gupta

5/24/2007
Date

Enhanced Services and Interfaces for Television
(Possibilities for WebTV-NG)

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Exhibit A

Meeting Goals

- Understand your vision, timetable, tough problems, …
- Feedback and brainstorming on our ideas
  - Interestingness / relevance of basic idea
  - Poke holes in vision / technology components / broadcaster relation issues / partnership problems
  - Brainstorm new possibilities / solutions / …
- If determine that it is interesting, then
  - How do we make it happen
  - How can we collaborate

Objective

Novel services and video-browsing functionality to substantially enhance the television viewing experience

Alternatively,

How do we leapfrog
TiVo and Replay
and avoid trench wars

Two Key Themes

- **Meta-data Standards and Services**
  - **Meta Data:**
    - Indexes; segmentation; highlights; commentary; …
  - **Producers:**
    - Broadcasters, third-party professionals, viewers, …
  - **Service:**
    - Market-place for meta-data producers and consumers
    - Software and hardware platform to support above
    - Making it win-win for broadcasters and viewers
- **Enhanced Browsing (meta-data + local hard disk)**
  - **Navigation:**
    - Instant seek with visual or textual indexes; …
  - **Time Savings:**
    - Time-compression; highlights; …
  - **Rich Experience:**
    - Multi-camera views; instant replay; commentary; …
- **Note: Majority of content is NOT "live" anyway**

Agenda

- Objectives
- Scenarios + Study Results
- Making It Happen
  - Skipping advertisements
  - Copyright issues
  - Standardization issues
  - ...

Example Scenarios

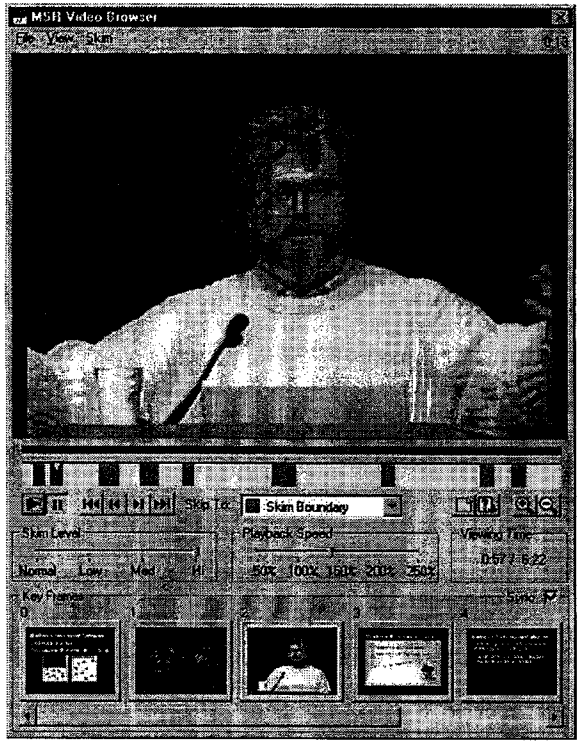
1. **Sports++**
   - Browse in short time using TC; indices; highlights; ...
2. **Long Vacation**
   - Hard disk compaction using highlights
3. **News Watcher's Nirvana**
   - Variable-detail custom newscasts
4. **Interactive Education / Shows / Town-Hall Meetings**
   - Commentary/Voting/... while live AND on-demand; D-TVI
5. **Multiple Viewpoint Sports Action**
   - See sports action from multiple camera angles
6. **Others:**
   - Extensions to streaming media and/or DVDs
   - Platform for home-video editing

Sports++: Watching Baseball

- John comes home after midnight. He has 30 minutes to watch the Oakland A's vs. Seattle Mariner's game

- WebTV-NG Experience:
  - Game already on hard-disk, as system knows his preferences
  - Starts watching using time-compression (say 1.25-fold)
  - Decides to skim. Segmentation from WebTV-NG Service:
    - Home-runs, base-steals, …
    - Oakland A's at bat vs. Mariner's at bat
    - Key plays by each player
    - Produced by broadcaster; via WebTV-NG service or ATVEF
  - Watches a 5-minute "highlights"
    - Produced by Dave Niehaus (highlights + text comments)
    - Automatically charged 25c for access (side-job for Niehaus)
    - Free machine-generated highlights from WebTV-NG
    - Option of combining highlights from multiple sources

Video Browsing Demo



Long Vacation: Too Much to Record!!!

- Family takes a one week vacation
  - Dad wants major baseball and basketball games
  - Kids want Discovery Channel + Pokemon shows
  - Mom wants various gardening shows
  - Total Show Time = 50 hours; Hard Disk Capacity = 20 hours

- WebTV-NG Solution: Save only the highlights (factor 2.5)
  - Highlights generated by:
    - Broadcasters; Professional Editors; Friends & Family; ...
    - Broadcaster highlights via ATVEF or via WebTV-NG service
  - Delete segments not belonging to highlights:
    - Available: Prior / Concurrent / After the "live" broadcast
  - Additional storage savings via time-compressed versions
    - Or lower quality versions, ..., decaying over time with age, ...

- Video browser to skip; time-compress; ... stored highlights

News Watcher's Nirvana

- Providing best of PBS + CNN Headline + more
- Today: News for "live" broad-spectrum TV audience
  - Shallow coverage for most topics; focus on mass appeal
  - Significant repetition for people tuning-in at different times
- WebTV-NG Experience:
  - Special news channels not meant for "live" watching (MSNBC-NG)
    - Stories in headline / short / long versions
    - Stories on a wide range of topics
    - Headlines / Updates / Mass-appeal stories sent more often
  - WebTV-NG box records stories on hard disk
    - Based on explicitly specified user interests
    - Or, implicitly determined user interests (e.g., SVM classification)
    - Degree of interest determines which version gets stored
  - Video browser used to time-compress / skim stories
    - Cost of recording is low; easy to skip
  - Motivation for broadcaster to participate
    - 1) Gain viewer share 2) Viewers spend more time on content

Interactive Education / Shows / Town-Hall Mtgs

- **Teacher tells 5th graders:**
  - We'll watch the Discovery channel "Whales" show at 5pm
  - Here's the URL

- **WebTV-NG Experience:**
  - Easy set-up of web-page + chat-room with WebTV-NG Service
  - Live experience
    - Along with video, there is a chat room, … dedicated to the class
    - The teacher can also interact using multiple-choice questions
    - Also available: extras from Discovery/Sponsors via WebTV-NG Service
  - On-Demand experience
    - The show is recorded on WebTV-NG hard disk
    - Chat etc archived as annotations on the WebTV-NG service
    - Multiple-choice questions are still active
    - Use video-browser to skim: content vs. annotation centric views
  - PC-Based experience
    - Same as "on-demand" except uses streaming video

- **Experience generalizes to watching shows / …**
  - E.g., friends watch show; chat; 0-9 ratings; … live + on-demand

Multiple-View Sports Action

- Sports viewers wish list:
  - ..., instant replay, ...
  - Ability to watch action from multiple viewpoints

- WebTV-NG Experience:
  - Broadcasters send out multiple viewpoints:
    - Concurrently on two different channels
    - Time delayed on the same channel
    - Whole game, or only highlighted segments
  - WebTV-NG records multiple viewpoints on hard disk
    - Limits: disk bandwidth; tuners; encoders; storage; ...
  - While browsing game, watch multiple viewpoints
    - Picture in picture
    - Instant replay with different viewpoint
    - ...

Extensions to Streaming Media / DVDs

- The WebTV-NG Meta-Data Service can also be leveraged for streaming media and/or DVDs

- Example Scenarios:
  - Discovery channel scenario:
    - Video content can also be watched from PC via streaming
    - Annotations can be made / retrieved from WebTV-NG service
    - Annotations can also be shared via email (if no service)
  - Latest update on DVD movie from studio / fan-club
    - DVDs already come with certain meta-data on them
    - WebTV-NG service provides way to update or add new data
  - Film criticism class (asynchronous):
    - Students buy Casablanca DVD for critical analysis
    - As they watch from DVD player (connected via WebTV-NG box) they make comments (stored on WebTV-NG service)
    - Comments available to all students / instructor on-demand
  - Watch a movie together (synchronous)
    - Similar to D-TVI, but done on DVD content

Platform for Home Video Editing

- Tremendous penetration of camcorders
  - Most home- video is boring; skipping a pain on tape
  - Editing on PC and/or camcorder is complex and a pain
  - Need for "coarse" editing rather than professional

- WebTV-NG Experience:
  - Play/record on to hard disk of WebTV-NG (HW encoder)
  - Super-simple segment-selection app on WebTV-NG
  - Leverage instant-seek, TC, … for browsing / editing
  - Playback selected segments only (HW decoder):
    - Back to NTSC via MPEG-2 decoder and old tape-based VCR
    - Leave video on local hard-disk; edit list on WebTV-NG service
    - Store edited video on writeable CD-ROM / DVD
  - Other:
    - Add text annotations to segments; …
    - If MPEG-1 quality is adequate, local storage less of an issue

Video Browsing Study

- **Provided prototype video browser to subjects**
  - Standard VCR controls
  - Speed-up controls: Time-compression, Pause Removal
  - Textual indices: TOC, Notes
  - Visual indices: Shot boundaries, time-line markers
  - Jump controls: jump-back-X, jump-forward-X
- **Six video categories:**
  - Classroom lecture
  - Conference presentation
  - Sports
  - Soaps
  - News
  - Travel
- **Goals:**
  - Understand browsing behavior and usage of features
  - Understand user excitement and user value
  - Understand user-interface issues

Video Browsing Study Results

- **Browser substantially enhanced user experience:**
  - Standard VCR controls hardly ever used
  - Significant use of new controls
    - Time compression and pause-removal (avg speed-up ~1.4)
    - Shot boundaries to skip intros, advts, … next news story
    - Table of contents and even personal notes
  - Said it will change their viewing patterns
    - E.g. Sports: (6.0); News: (6.9) … scale 1-7, 7=strongly agree
- **Behavior different based on content type:**
  - Informational audio (lectures, presentations)
  - Informational video (news, sports, travel)
  - Narrative entertainment (shows)
- **In all cases:**
  - Viewers appreciated the ability to save time
  - Viewers appreciated the feeling of being in control

Agenda

- Objectives
- Scenarios + Study Results
- Making It Happen

Making It Happen

- Dealing with advertisements
- Copyright issues
- Standardization:
  - Global time stamps
  - Meta-data schemas
- Meta-data software platform
- WebTV-NG hardware
- Meta-Data creation process
- Relation to Triton/Neptune

Ad Skipping: The Big Road Block?

- **Potential key issue with broadcasters:**
  - **This would be the first kind of meta-data people produce**

- **Two components to solution:**
  - **Track viewership / viewing behavior via box-service combo**
  - **Novel mechanisms that allows flexible policies regarding skipping of advertisements**

Tracking Viewer-ship / Viewing Behavior

- **Determining content-ID:**
  - Based on time, channel, zip code of viewer
  - Embedded in the content or transport stream
    - Sent periodically; OK if recording starts in middle of program

- **If WebTV-NG box/service knows content-ID:**
  - Easy to track what content an end-user is watching:
    - For how long
    - At what time of day
    - Segments of content skipped
    - Regular play mode or time-compressed mode
    - ...
  - Details uploaded to WebTV-NG Service

Skipping Advertisements

- Current situation:
  - TiVO / Replay / WebTV
    - Fast forward through advertisements
    - Skip forward 25 seconds
    - ...
  - Other proposals:
    - Force advertisements at beginning of show (Broadcast.com)
    - Skip-button never takes you past an advertisement
    - Skip shows at least a short version of advertisement
    - ...

- Need to create win-win for broadcasters AND viewers
  - Focus on mechanisms allowing variety of policies
    - E.g., No advts as I pay subscription charges
    - E.g., Lots of advts as I want the same programming free
    - Flexibility on what and when advts are shown

Proposed Solution

- Currently, specific advertisements are linked to specific points in the timeline of content

- Key idea: Decouple linking of advertisement to specific point in timeline of content
  - Advt shown to viewer based on amount of time he/she has viewed that program (cumulatively across multiple sittings)
  - Advt shown based on updatable collection stored on the local hard-disk
  - Skip controls don't work during advertisements
  - Exact insertion point may be guided by preference-points indicated by broadcaster (meta-data)

- Time-interval between advts can be an arbitrary function based on broadcasters' business model
  - E.g., prime-time vs. non-prime-time content
  - E.g., whether viewer is paying subscription charges
  - E.g., above controllable by viewer on a per-program basis
  - E.g., advt shown may be determined by requirement to meet certain quotas by broadcaster

- What advertisements are shown can also be dynamically and flexibly decided. Furthermore,
  - Because know viewing patterns, advts can be targeted
  - Because know connected to Internet, advts can be specialized

- Conflicts with advts broadcast in analog channel
  - Short-term: Are viewers being penalized, even if they can skip advts in the analog channel?
  - Long-term: If we know where advts are, we can compensate and dynamically modify the auto-advt-insertion decisions

New Advertisement Business Models

- An example:
  - Advertisements acquired / marketed by WebTV-NG service
  - WebTV-NG shares revenue with content provider, if advt is shown while their content is being viewed
  - Potentially attractive for small outfits producing content
- Others:
  - ...

Copyrights Issues

- **Brief conversation with:**
  - **Louis Carbonneau (LCA)**
  - **Tom Rubin (LCA)**

- **High-level points:**
  - **Worth pursuing (not dead at birth)**
  - **Lots of delicate balances**
  - **Devil is in the details**
  - **Should keep them in the loop**

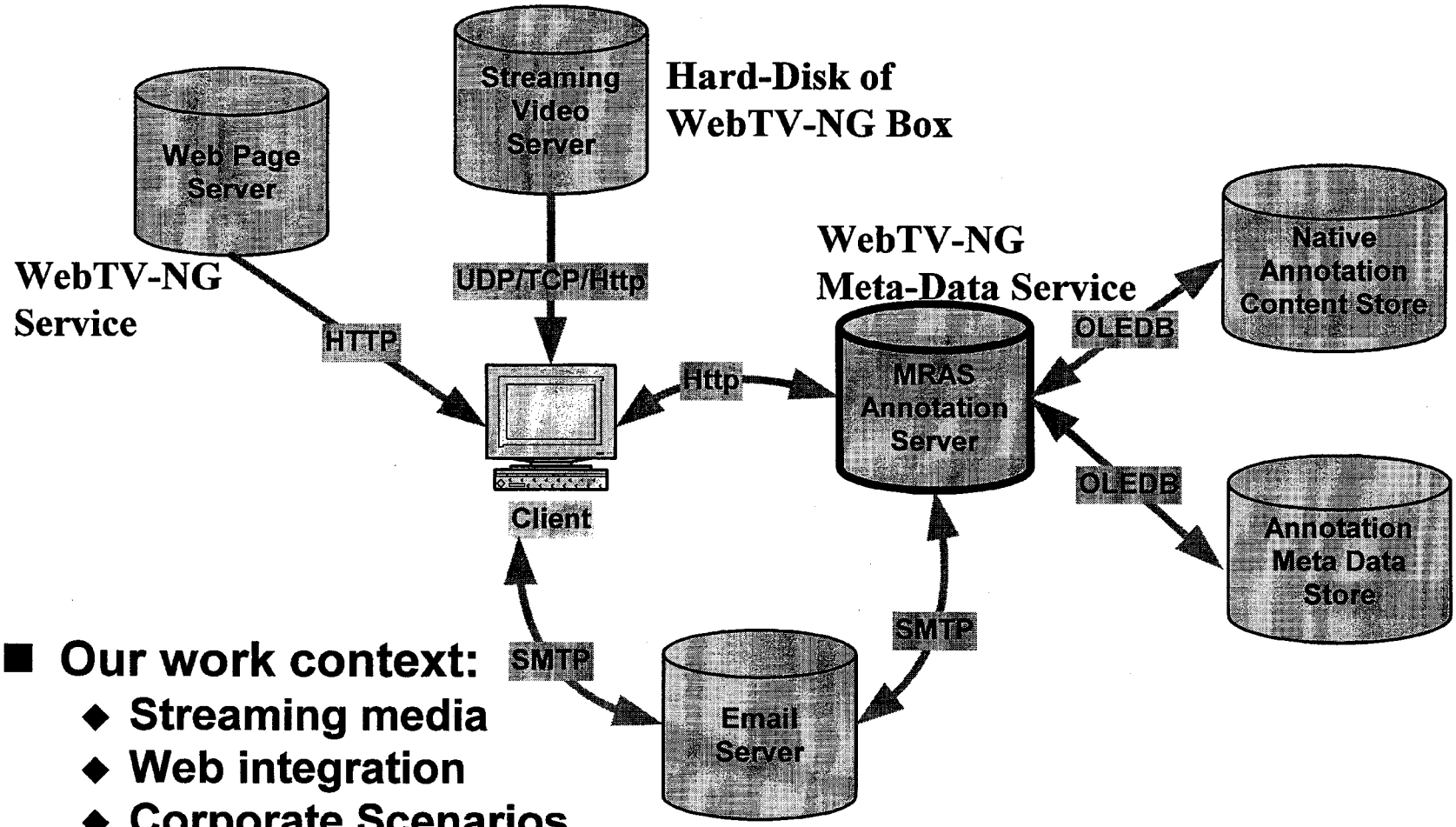
Time-Stamping Standards

- **Universal / Global time-stamps on content**
  - Necessary to annotate once, benefit everywhere
- **Standardize on time units used (robustness)**
  - SMPTE
  - Milliseconds
- **How to determine offset into the show**
  - How do I determine start of a show?
  - What if I start recording in middle of show?
  - Can I leverage the closed-caption channel and ATVEF?
  - Can I leverage the horizontal overscan channel?
  - Can I synchronize clocks of various WebTV-NG boxes (NTP)?
  - Will the broadcasters be willing to add special signals to indicate start of show?

Meta-Data Standards

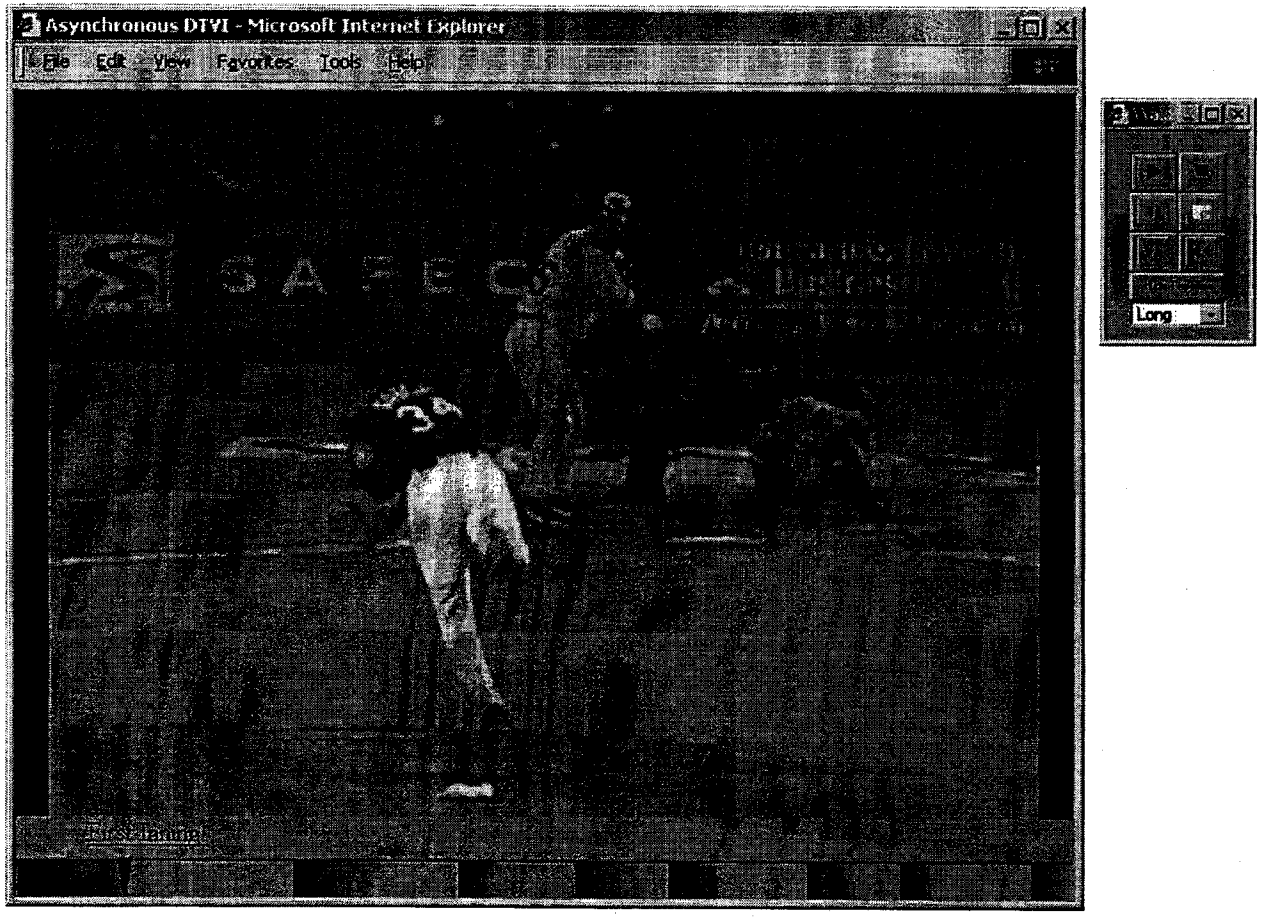
- Without meta-data guidelines, it may be tough to get wide acceptance of the new services
  - UI software may not know how to display meta-data
  - Poor UI may cause users to become frustrated
  - No best-practice models for producers to follow
- Establish standards for meta-data format (XML-based)
  - Schema description language
  - Fixed/extensible schemas for categories of content
    - E.g., baseball vs. basketball vs. news vs. …
    - Pre-specified categories will help with UI
- Establish standards for object-model / query-interface
  - This is really an interface to the meta-data service
- Role of ATVEF (?)
  - Broadcaster controlled, rather than third-party
  - Synchronous with content, rather than on-demand

Meta-Data Software Platform (MRAS)

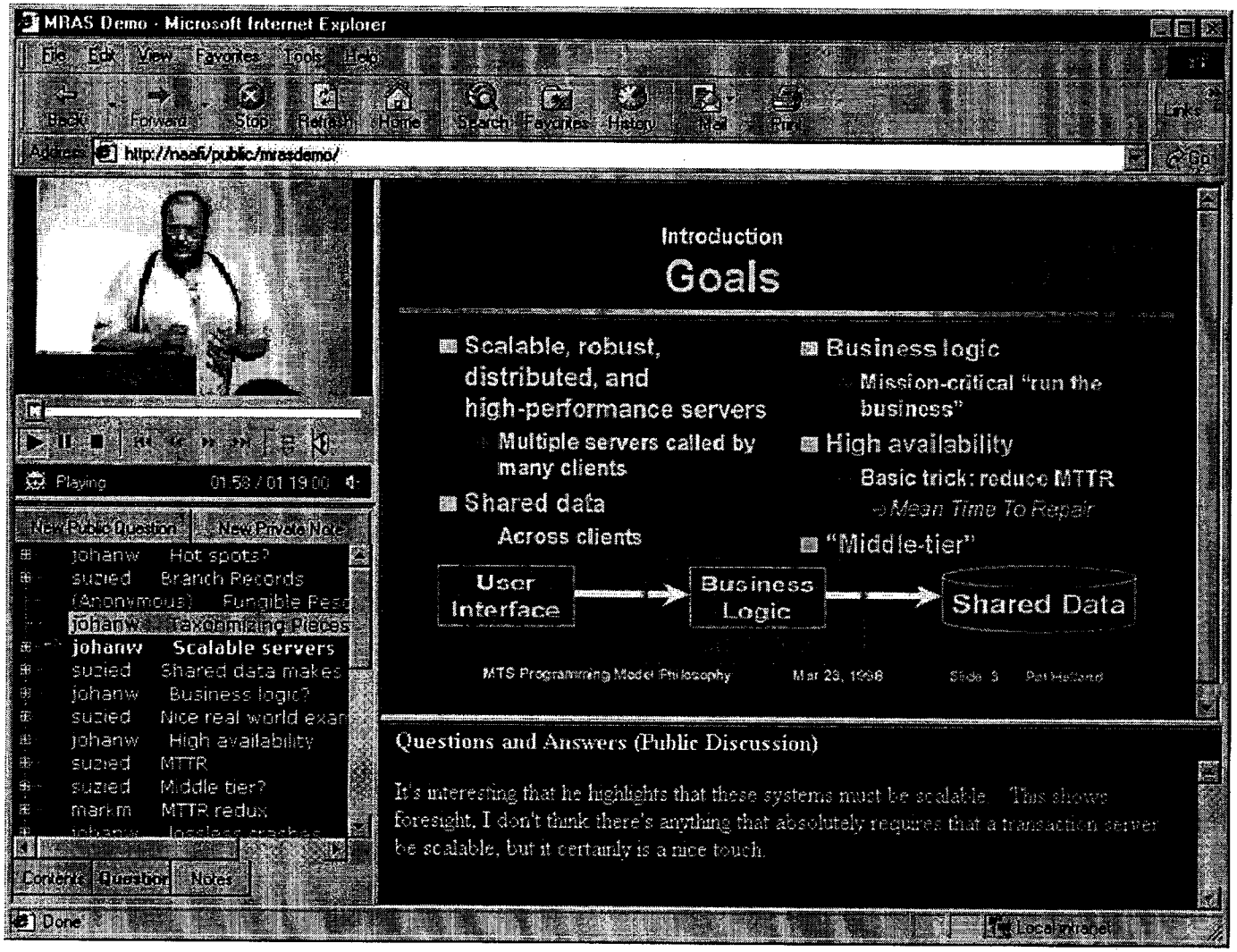


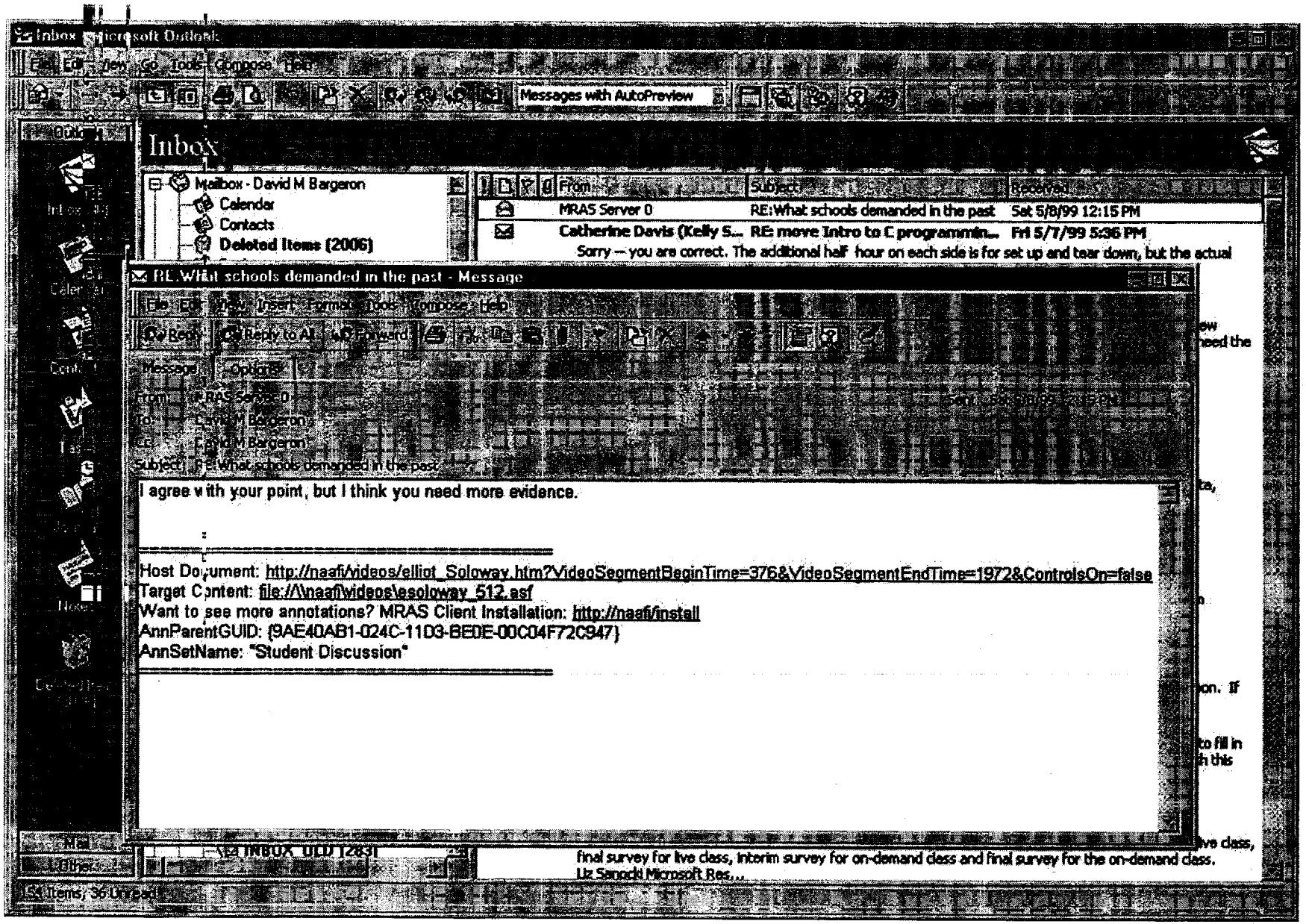
- **Our work context:**
  - Streaming media
  - Web integration
  - Corporate Scenarios

Annotations Demo



Annotations Demo




Inbox - Microsoft Outlook
Inbox
Mailbox - David M Bargeron
Calendar
Contacts
Deleted Items (2006)
From
Subject
Received
MRAS Server 0
RE:What schools demanded in the past
Sat 5/8/99 12:15 PM
Catherine Davis (Kelly S...
RE: move Intro to C programmin...
Fri 5/7/99 5:36 PM
Sorry -- you are correct. The additional half hour on each side is for set up and tear down, but the actual
RE:What schools demanded in the past - Message
Reply
Reply to All
Forward
Message
Options
From: MRAS Server 0
To: David M Bargeron
Cc: David M Bargeron
Subject: RE:What schools demanded in the past
I agree with your point, but I think you need more evidence.
Host Document: http://naafi/videos/elliot_Soloway.htm?VideoSegmentBeginTime=376&VideoSegmentEndTime=1972&ControlsOn=false
Target Content: file://\\naafi\videos\esoloway_512.asf
Want to see more annotations? MRAS Client Installation: http://naafi/install
AnnParentGUID: {9AE40AB1-024C-11D3-BEDE-00C04F72C947}
AnnSetName: "Student Discussion"
final survey for live class, interim survey for on-demand class and final survey for the on-demand class.
Liz Sanocki Microsoft Res...
Items, 36 Unread

Some Unique Aspects

- Representing context (anchors)
- Annotation sets
- Displaying Annotations
  - Timeline-centric view
  - Annotation-centric views
- Integration with email
- Multiple annotation types

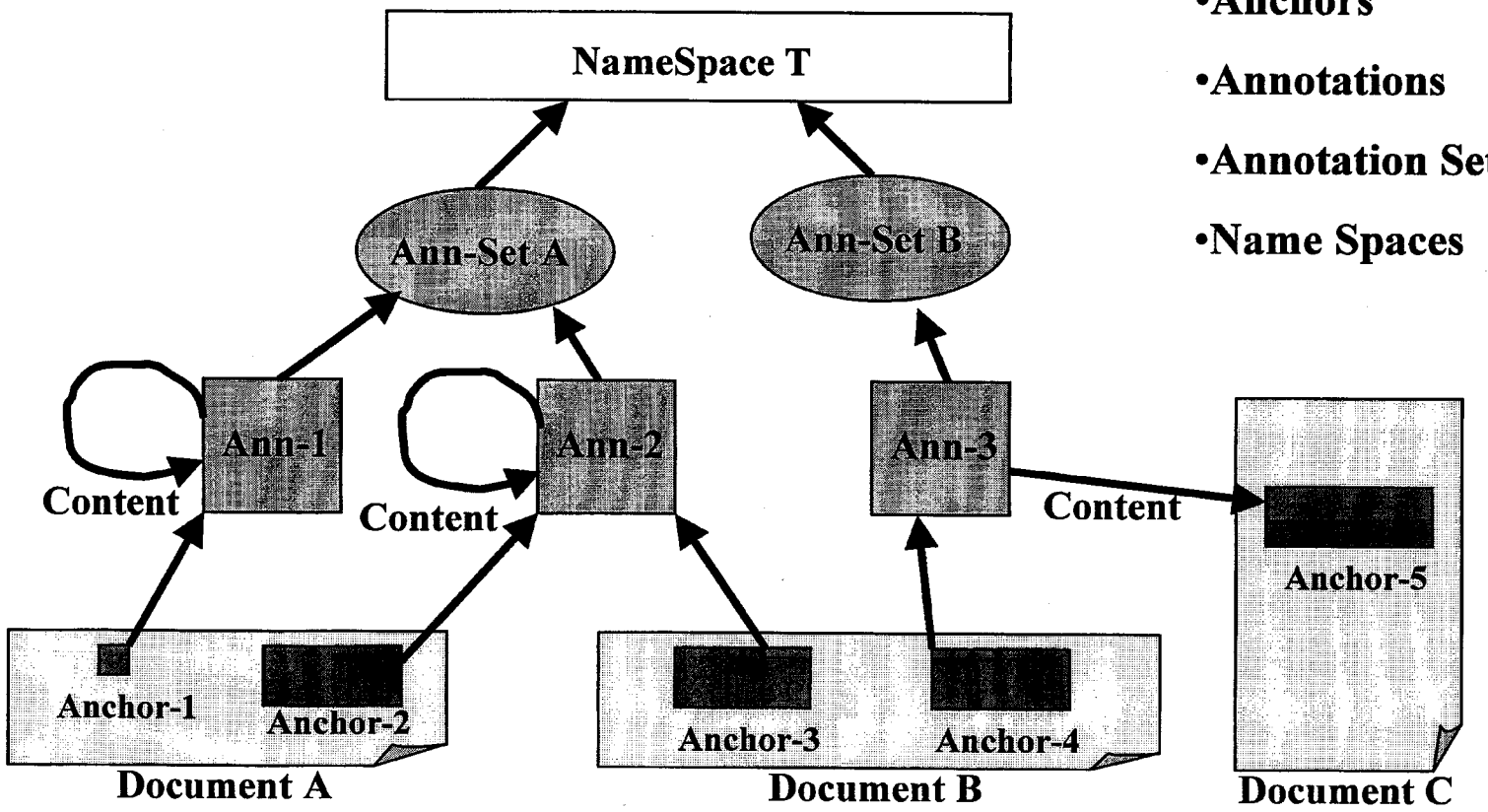
An Extensible Annotation Platform

- Organized "annotations" offsite in April '99
  - Office, MSR, MSN, NetDocs, ePad, eBook, ePaper, MLT, Tahoe, NetMeeting, NetShow, ...
  - Key outcomes:
    - Familiarity with needs of various MS groups
    - Common schema + object model desirable

- Subsequent happenings:
  - BillG push for all of us to think harder
  - Increased interest from ePaper/eTablet/NetDocs/MLT
  - Produced:
    - Rough requirements document
    - Initial work on Common Annotation Framework
  - Which group takes ownership?

A Common Annotation Framework

- Documents
- Anchors
- Annotations
- Annotation Sets
- Name Spaces



WebTV-NG Box: New Functionality

- **Ability to render play-lists:**
  - Segments may be from same MPEG file (e.g., highlights)
  - Or, different MPEG-files (e.g., inserted advertisement)
- **Support for time-compression:**
  - CPU power to manipulate the audio track
  - MPEG Decoder + Software so that video track remains in sync (e.g., ability to drop selected B / P / I frames)
- **Video Browser application**
- **Annotation client**
- **MPEG Encoder**
  - Recording from analog TV (e.g., Home Video Editing application)
- **...**

Meta-Data Creation Process

- **Four main sources:**
  - Third-Party professionals
  - Broadcasters
  - Regular viewers
  - Machine generated

- **Third-Party professionals:**
  - Record program on their WebTV-NG box
    - Make annotations using their remote keyboard
    - Pre-defined vocab depending on content type, to simplify UI
    - When done, upload annotations to WebTV-NG Service
    - On upload, annotations forwarded to all who have subscribed
    - Non-subscribers can retrieve on-demand; may be charged
  - Record program on their PC (use std tuner card)
    - Create annotations as above and upload
    - Need global time-stamps and global content-ID

- WebTV-NG service records program
  - Editors watch via streaming media, and annotate
  - WebTV-NG worries about time-stamps / content-ID / …
- Add annotations during "live" broadcast
  - Special interfaces to make comments/categorize in real-time
  - May do this on PC or on WebTV-NG box
  - Comments are pushed out within seconds to subscribers

Broadcasters

- For digital channels and programs
  - Push down meta-data via ATVEF
  - WebTV-NG box converts ATVEF to "WebTV" standard
  - WebTV-NG Service listens in:
    - Converts ATVEF to "WebTV" standard (maybe same)
    - All meta-data also available to analog TV users
- For analog channels
  - Can exploit WebTV-NG service to supply meta-data to all

- **Regular viewers**
  - To some extent, same tools/processes as professionals
  - "Live" voting across all WebTV-NG viewers
    - Users vote "0-9" on their remote control / keyboards
    - The vote is propagated up/down hierarchy of servers
    - Updated results shown on TV within few seconds
  - "Live" chat around TV content among friends
    - Buddy list to know who else is online
    - Easy set-up of chat group; pre-canned UI; …
    - Archived as commentary on WebTV-NG service for group members who will watch the program on-demand
- **Machine generated**
  - No special needs … uploaded just like any other meta-data

Relation to Triton/Neptune Effort

- **Lower-end / Lower-cost device**
  - Not just top 25% of house-holds
  - It is not an add-on (building on top of xBox)
- **Appliance like**
  - Single self-contained device (not building on top of xBox)
  - Focused functionality on television experience
    - Needs to be best at DVR + Browsing experience
    - Many buyers will already have PC for web and email
- **Service centric**
  - Focus on third-party meta-data and service around it
  - Though, photo management and MP3/MS-Audio music from Triton sound like great possible additions
- **Neptune / Triton could consider adding this emphasis on meta-data to their charter**

Concluding Remarks (1 of 2)

- Unique opportunity to provide greatly enhanced television viewing experience

- Key forces making this possible:
  - Cheap and decreasing price of hard-disks
    - Makes cost & adoption dynamics fundamentally different from late 1980s ITV experiments
      - Removes dependence on broadband infrastructure
      - One-time fixed dropping cost rather than ongoing cost
    - Works well with today's analog and digital infrastructure
    - Enhanced browsing experience using local CPU power
  - Internet connectivity / WebTV-NG service
    - Enhancements come as "meta-data" over the Internet
    - Service provides "market-place and standards" for producers and consumers
    - Bandwidth needs are very low

Concluding Remarks (2 of 2)

- Possible next steps
  - Consolidate IP in this area
    - Defensive and offensive
  - Prioritization of various features/scenarios
  - Build the first prototypes and do user testing
    - Role of MSR? Role of WebTV/Neptune/Triton? Others?
  - Leverage first mover advantage
    - Thought leadership
    - Partnerships
    - Standards
    - Learning from customer experience
  - Leverage other MS resources
    - MS-NBC; WMT; expanded focus on services; …

- End Goal: Offer the "Best Consumer TV Experience"